



H.E.F. CANADA QUARTERLY

The Human Ecology Foundation of Canada

Vol. VI, No. 1 (March, 1984)

Contents

Notes from the Editor	1
President's Message.....	2
Impressions.....	3
A Personal Assessment of Alternate Health Therapies, Lynne Kolodzie	4
The Ecologically Sound Halfway House, Dr. Jozef Krop	7
Tobacco Smoke Causes Serious Health Problems in Non-Smokers, John Moore	9
Notice of Annual Meeting	12
Smoking on Airlines	13
Designers Workshop Addresses Indoor Pollution, Norman T. Gilroy	14
Neurotoxic Follies, Alan Anderson	18
Indoor Air Pollution: The Home, Dr. Phyllis Saifer and Dr. Mark Saifer	31

THE HUMAN ECOLOGY FOUNDATION OF CANADA

The H.E.F. Canada Quarterly

The H.E.F. Canada Quarterly is a publication of The Human Ecology Foundation of Canada, a charitable organization under Canadian law, operating on a non-profit basis. The Quarterly is for people who are interested in health and its relation to our environment. It deals primarily with research in the field of clinical ecology, and also describes how people have improved their health by changes in habits, diet, and environment. As such, it does not offer medical advice, and we urge persons wishing to experiment with changes in their lifestyle to do so with the help and guidance of a knowledgeable physician.

The Human Ecology Foundation of Canada

One of the purposes of the Human Ecology Foundation is to promote the free exchange of information on the prevention and treatment of ecological illness. People who are ecologically ill are no longer able to adapt well to common exposures in their everyday environment. They may develop a variety of chronic or acute symptoms that are brought on by substances in the air, in food, or in water.

Natural inhalants such as pollens, dust, and moulds, and even natural foods may begin to affect people adversely. This aspect of the condition is often referred to as allergy. But the many synthetic chemicals that are now common around us can also cause symptoms, and overexposure to these can trigger ecological illness even in those with no history of allergy or other sensitivity to the environment. Symptoms may be mild and merely annoying, or they may become severe enough to interfere with a person's daily activities, family life, and career.

On a local basis, HEF Branches work toward finding sources of chemically less-contaminated food, water, clothing, and household furnishings, as well as providing counselling on changes of lifestyle that may alleviate symptoms. The Foundation and all its Branches would like to encourage others to become involved not only in research on the effects of environment on health, but in working toward a healthier, less-polluted environment.

Subscription and Membership

Membership in the Foundation includes a subscription to the H.E.F. Quarterly, which is produced four times per year. Annual membership and subscription fee is \$20.00.

Product Information

Any products mentioned in the Quarterly should be carefully evaluated for personal compatibility, since individual sensitivities vary widely. Mention of a product does not imply that the Human Ecology Foundation endorses that product or service.

Notes From the Editor

It is with regret that I announce my resignation as editor of the Human Ecology Foundation of Canada Quarterly, effective July 1, 1984. A new business which will be born on that date will leave me no spare time. I've enjoyed my two years as editor. I've learned much, made many new contacts and heard from fascinating people. It was an experience I'm glad I didn't miss. I want to thank you for contributing your stories and your ideas to the Quarterly.

The Quarterly needs a new editor for the September, 1984 issue. If you are interested in donating your talents, please contact:

Darlene Koski, President,
Human Ecology Foundation of Canada,
65 Dolly Varden Blvd.,
Scarborough, Ontario,
M1H 2K2

Tell Darlene about yourself: your qualifications, the reasons for your interest, your aims and objectives for the Quarterly.

I would also like to thank Marg Schiedel, friend, mentor, critic, cartoonist, and typist for her help in putting together each issue of the Quarterly. Without her help I would never have managed to get a single issue to the printer. Really, I should thank the whole Schiedel family for their help. They licked stamps, stuffed envelopes, got their own meals, and generally maintained a tolerant silence when mom and Shirley were frantically scrambling to get the Quarterly out on schedule. For the new editor, I can only wish a typist like Marg.

Shirley M. Smith

A.I.A. Conference

June 22-24, 1984
Constellation Hotel,
Toronto, Ontario

For information contact:

Department of Professional and Managerial Development,
Humber College,
205 Humber College Blvd.,
Rexdale, Ontario,
M9W 5L7

Telephone: 416-675-5077

Editor's Note: While the A.I.A. and the Human Ecology Foundation of Canada do not share all views on how the environment affects health, we can all benefit from an exchange of views and of information.

President's Message

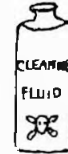
I'm in the middle of a battle

NO, NO, NO,

It's a war

It must be

I am being bombarded from every side



This war is taking place in a classroom.

Once Upon a Time

- | | |
|---|---|
| 1 Once upon a time
In a very large school
Teachers and children
Had lots to do. | 2 Preparing for Christmas
Kept them all busy.
Along came the painters
Then, many were dizzy. |
| 3 The odour of paint
Strong, to say the least;
Headaches and nausea
Ravaged many - like a beast! | 4 I plead and I beg
For someone to listen,
"Please save the painting
For summer vacation." |
| 5 "Schools can be aired."
"Only a few are affected."
Concern for the children
Will then be reflected. | 6 Absenteeism is now high.
"It's only the flu",
Some teachers sigh.
But I wish they knew. |
| 7 Our children are the future
That should be our concern.
How can they function
When their little eyes burn? | |

Darlene Koski

Editor's Note:

The Kitchener and Toronto branches are preparing a presentation which is to be used to inform educators and parents of the problems presented by pollution in the schools. This information package will be published in the Quarterly as soon as it is available to us.

Impressions

A PSALM OF LIFE

"WHAT THE HEART OF THE YOUNG MAN SAID TO THE PSALMIST"

Tell me not, in mournful numbers,
"Life is but an empty dream!"
For the soul is dead that slumbers,
And things are not what they seem.

Life is real! Life is earnest!
And the grave is not its goal;
"Dust thou art, to dust returnest",
Was not spoken of the soul.

Not enjoyment, and not sorrow,
Is our destined end or way;
But to act, that each to-morrow
Find us farther than to-day.

Art is long, and Time is fleeting,
And our hearts, though stout and brave,
Still, like muffled drums, are beating
Funeral marches to the grave.

In the world's broad field of battle,
In the bivouac of Life,
Be not like dumb, driven cattle!
Be a hero in the strife!

Trust no Future, howe'er pleasant!
Let the dead Past bury its dead!
Act-act in the living Present!
Heart within, and God o'erhead!

Lives of great men all remind us
We can make our lives sublime,
And, departing, leave behind us
Footprints on the sands of time;-

Footprints, that perhaps another,
Sailing o'er life's solemn main,
A forlorn and shipwrecked brother,
Seeing, shall take heart again.

Let us, then, be up and doing,
With a heart for any fate;
Still achieving, still pursuing,
Learn to labour and to wait.

Henry Wadsworth Longfellow

A PERSONAL ASSESSMENT OF ALTERNATE HEALTH THERAPIES

Lynne Kolodzie

Four years ago I was so alarmed at the downward trend of my health, and the accompanying mental confusion and depression, that I took a bold step. I decided I would find out for myself what had caused my misery and deal with "it" firmly and openly, no matter what I had to do. Nothing could be worse than the shadows of my anxiety and ignorance!

Although I liked and respected my family doctor and had always been treated well, it was obvious he didn't know what more to do for me. The numerous specialists to whom I'd been sent all had conflicting opinions. Their treatments either made me worse or did nothing at all. So the latest diagnosis - that my health problems were caused by my inability to cope with stress - became a direct challenge.

Since my knowledge about stress therapy was sketchily limited to reading occasional articles about Dr. Hans Selye in the newspaper, I was not an educated health care consumer. Since I thought stress problems were strictly psychological in origin, I decided to tackle my health problems from that angle.

Thankfully I had enough common sense to shop around for a psychotherapist. I chose a woman who had helped a close friend, had excellent credentials, and answered my queries openly on the phone.

For seven months I worked with her to unravel what was over-stressing me emotionally. Interestingly, I was most stressed because my health continued to worsen. However, I learned some techniques for handling life's challenges more appropriately. That training strengthened me for the next stage in my search. I was happy to learn I was not psychologically maladjusted. But where should I go for help now that I had "graduated" from psychotherapy?

And so I blithely began a personal investigation into health routes other than traditional medicine, a journey I thought would be straight-forward and simple. In my innocence, later my desperation, and ultimately my determination to leave no stone unturned, I have wandered through a mine-field of alternatives. Perhaps I have garnered information that could aid others.

Since December, 1980, I have tried clinical ecology to the fullest possible degree, even a thirty day hospital stay at the Randolph Clinic in Chicago. The latter was necessary, I think, to save my life after a 20 month exposure to urea formaldehyde insulation. I have also tried acupuncture, acupressure (Shiatsu), colonics, counselling, creative visualization, foot reflexology, herbal teas, homeopathy, jogging, massage, nutritional therapy, progesterone treatment, rebounding, relaxation techniques, spiritual healing sessions, Touch for Health, and applied kineseology and Vita Florum products. Since every technique had helped somehow, I wanted to assess the merits of each in order to select the best combination for me and my family.

Any health care method not approved by traditional physicians costs a lot because it is rarely covered by OHIP or insurance.

Many therapists recognize the fact that allergies and their management have become a high profile health problem in modern times. However, some are very rigid about the road to good health - it is their method or none. Personality clashes occurred with other therapists as they tried to wrest control and responsibility from me, either patronizing me for my ignorance or openly mocking whatever methods had led to my current success. It didn't make sense to lower my stress load physically if it meant adding to it mentally and/or emotionally by a conflict with the practitioner. Thus, for financial or personal reasons, I eliminated several health therapists from my list.]x

Then, I considered the elements in common shared by the different methods. Every one agreed that:

- (a) we are bio-chemical entities activated by energy from the universe;
- (b) we have minds and wills to help us foster our own health and happiness;
- (c) a sense of well-being results from balancing our energy between body, mind, and spirit.

Interesting in theory, but now I had to make pragmatic choices.

Next I considered the apparent drawbacks of each approach. The clinical ecology route saved my life and was a necessary foundation, yet its very slowness was at variance with my impatient nature. Homeopaths and foot reflexologists claimed that illness was the result of accumulated toxins in the chemical, physical, and spiritual spheres, and that cleansing at all levels would release the self-healing mechanism. There was a drawback though - one could get worse before one got better. I wondered if anything could be rougher than unmasking my allergies in a U.F.F.I. contaminated house!

When I considered the mental/emotional/spiritual element in healing, I was in total agreement with the need to cleanse and balance our lives in these spheres. However, I was in conflict with the philosophy or methodology of many routes open to me. For one thing, often they were too rigid or intense for my liking. Some spiritual healers claimed illness was the work of the devil. Metaphysical healers stated that ill health and evil were only in the mind, the physical manifestation of our undeveloped psyches. The psychologically-inclined claimed all health problems resulted from unresolved conflicts in childhood, still operating at a subconscious level when we became adults. This was all interesting as philosophies to debate, but I wanted to be well now. Since I believed in God and prayer and being responsible for a balanced and positive outlook on life, I concluded that shifting my focus onto what I believed was right and good about life was the best therapy of all.

Finally, with the help of my husband and my two doctors - all of whom supported my determined search with respect, interest and patience - I have worked out a system that works excellently for me. The foundation of my health care has been laid in a

"safe" home and good family life. Since we lost nearly everything in our U.F.F.I. experience except the will to live for a better day, securing a healthy home was not easy. However, I have observed that no health route is very successful for allergic people unless they have this base.

A comprehensive allergy management program à la clinical ecology is still mandatory for me. This involves not only carefully controlling my environment, but also eating organically grown food, drinking spring water safe for me and using several chemical and inhalant serums, including candida de-sensitization. An equally necessary treatment involves acupuncture, vitamin shots, nutritional therapy, Bach remedies, and counselling. Another necessity is regular adjustments, including acupressure and massage, by a skilled chiropractor in our area. Lately, I have been strong enough and motivated enough to pursue regular exercises based on Yoga and Alexander technique. And I jog or jump on the rebounder to defuse hyper reactions.

A regular and essential element in my health program involves detoxification. Acupuncture, foot reflexology, acupressure, massage, homeopathy, colonics, enemas, Vitamin C, and herbal teas all help. I have chosen methods I can use at home or the services of a local practitioner I can afford. Included in detoxification is the endless battle against those yeasty beasts we know so well - Candida. I have had incredibly good results with La Pachó (Pau d'Arco) tea.

Finally, I work on self-awareness and personal growth in my own eclectic style. An excellent relaxation tape helps me diffuse emotional over-reactions, no matter the cause. Creative visualization is fun. Anything that tickles my sense of humour is encouraged. And I reach for God even before the Vitamin C.

I wonder if this is called an holistic approach?

Editor's Note:

Each of us is an individual. We must use care and common sense in selecting our own particular routes to health. The Human Ecology Foundation admires Ms. Kolodzie's determination in pursuing all avenues which specifically improve her health and thanks her for sharing her experiences with us. Nevertheless, the Foundation must state that it does not advocate all these approaches.

The Ecologically Sound Halfway House

Dr. Jozef Krop

I think that the establishment of a halfway house for our ecologically ill patients is extremely important and that, therefore, the Human Ecology Foundation should make that one of our highest priorities.

The Halfway House: Description

- (a) The House: The house would have to be built according to ecological standards:
 - (i) careful siting to ensure a minimum of air pollution
 - (ii) careful construction to ensure a minimum of indoor air pollution. Particular care would have to be taken in the choice of heating and air-conditioning systems, of flooring, furnishings and decor.
- (b) The Water Supply: There would have to be a plentiful supply of clean, safe water.
- (c) The Food: There would have to be available a wide variety of organically grown foods.
- (d) The Staff: Staff would need to be available to instruct the residents of this house in:
 - (i) the methods for elimination of chemicals from the individual's home environment
 - (ii) the intricacies of the rotation diet
 - (iii) the importance of using only organically grown foods
 - (iv) relaxation techniques
 - (v) exercise routines
- (e) The Physician: A clinical ecologist would have to be on call at all times.
- (f) The Financial Situation: The house should be financially profitable. Because there are few clinical ecologists in Canada, I think we would have to advertise our house in environmental units in the United States. Also, I think that some of the profits from that house could be donated to the Human Ecology Foundation and written off as a tax shelter.

The Four Environments of the Ideal Treatment Program

1) The First Environment: The Environmental Health Unit

There are presently no environmental health units in Canada, but, there are several in the United States, in Chicago, Dallas, and LaCrosse, Wisconsin, for example. These units provide the purest environment and it is here that many people begin their therapy. Here, sensitivities are fully unmasked. When an individual leaves one of these units, however, he frequently must, for lack of an alternative, return to his home which has not yet been fully stripped of substances to which he is sensitive. Consequently, these people are often more ill than they were before they entered the environmental unit.

2) The Second Environment: The Halfway House

For people leaving an environmental health unit, the half-way house with its clean air, clean water, clean food and teaching staff would be most beneficial. Although the residents would be exposed to pollens (trees, grasses, weeds), depending on the season, they would not be forced to adapt to the chemical load of pollutants at the same time. The availability of support and teaching staff would facilitate the development of a new, ecologically sound life-style.

3) The Third Environment: The Home

When the individual returns to his home, he will be exposed - in spite of the most careful cleaning - to chemical pollutants. In addition, he will be exposed to urban air pollution and the contaminants which are an inevitable part of normal life in the 1980s. At this point, it is important for him to establish an oasis for himself - at the very least, a bedroom which is stripped of all offending substances.

4) The Fourth Environment: The Work Place

Returning an efficient, healthy person to his work place is the goal of treatment. Of course, it is essential that the patient maintain his oasis at home and adhere to his rotation diet of organically grown foods. Occasionally, he might even return to the halfway house where he could recuperate more fully.

Additional Functions of the Halfway House

1) Vacation retreat

2) Base for learning disabled and hyperactive children. With careful parental supervision and co-operative teachers, this house could offer an educational base for special needs, ecologically ill children.

Editor: Shirley M. Smith

Assistant Editor: Brenda Koski

Editorial Board: Dr. John Blair (Chairman)
Louise Cameron

Typist: Marg Schiedel

TOBACCO SMOKE CAUSES SERIOUS HEALTH PROBLEMS IN NON-SMOKERS

John Moore

A vast literature has accumulated based on studies of the health effects of tobacco smoke among smokers. This flood of evidence has had, at best, a relatively modest impact on the extent of smoking in Canada.

Thus, 37% of Canadian adults still smoke regularly and per capita cigarette consumption has actually increased. Any plan to substantially reduce the extent of smoking must overcome at least two major obstacles. First, smoking is a powerful addiction with failure rates after smoking cessation as high or higher than those for heroin addicts or alcoholics and, second, smoking is still socially acceptable thus, smokers do not receive enough negative feedback from non-smokers.

It is surprising that so little research has been done on the health effects of tobacco smoke among non-smokers. The ultimate in passive smoking is the exposure to tobacco smoke components absorbed by pregnant smokers and transmitted across the placenta to the blood stream of the fetus. There has been a substantial amount of research in this area and it is now clear that smoking during pregnancy results in increased risk of spontaneous abortion, retarded fetal growth (and thus, reduced birth weight) and increased risks of perinatal mortality and sudden infant death syndrome. Much less research has been done among children and adults chronically exposed to tobacco smoke. Such research is complicated by the fact that truly unexposed persons probably do not exist in most industrialized countries. However, some important research has been accomplished and is discussed briefly below.

Non-Smokers Blissfully Unaware

There is an old saying that familiarity breeds contempt. The converse is probably true, that is, the unusual or exotic breeds fascination. The public apparently has great concern for acid rain and other environmental pollution problems, many of which have not yet been demonstrated to pose significant public health problems. In contrast, the majority of non-smokers seem blissfully unaware of the health hazards due to their exposure to tobacco smoke.

But sidestream tobacco smoke contains much higher concentrations of several toxic chemicals than the smoke inhaled by the smoker. The air of rooms or areas contaminated by tobacco smoke contains carbon monoxide, formaldehyde, many chemicals known to be powerful carcinogens for humans and/or animals and many other noxious and toxic substances. The major contributor to indoor pollution by tobacco smoking is the sidestream smoke. N-nitrosodimethylamine (NDMA), also known as dimethylnitrosamine, is present in sidestream cigarette smoke at a concentration about 50 times greater than that in mainstream smoke. NDMA is one of the most potent carcinogens known and produces cancer in all animal species in which it has been tested and does so by various exposure routes including

among smokers who inhale up to 10 cigarettes per day. Finally, Hirayama in Japan and Trichopoulos *et al.* in Greece (Dr. Brian MacMahon at the Harvard School of Public Health was a co-author on the latter paper) have reported evidence that non-smoking women married to men who smoke have substantially increased risks of lung cancer. The Japanese report was based on a well designed cohort study and indicated that non-smoking women married to smokers of 20 or more cigarettes per day had a lung cancer rate 2.1 times as high as that for non-smoking women whose husbands never smoked. Hirayama has reported further evidence which indicates a similar risk for non-smoking men married to women who smoke.

What Can Be Done?

Given the evidence of very serious health problems among non-smokers attributable to exposure to tobacco smoke, what can be done to bring relief? It is obvious that no quick, easy solution exists but there are a number of promising areas for action by governments and individuals. First, non-smoking must be re-established as the social norm for all public areas, particularly indoor areas. This can be achieved by the judicious use of both education and legislation. Increased ventilation is usually not practical because of the high cost of energy to heat or cool the incoming fresh air. For example, to keep the concentration of suspended particulate matter in air below the ambient air quality standard when only one smoker was present in a room with a volume of 324 cubic feet required over 100 air changes per hour, a rate far in excess of that utilized in the design of office buildings or private homes. Second, programs aimed at preventing the initiation of the smoking habit among young persons must be greatly expanded. Governments can exploit mass advertising especially on television to promote non-smoking as a desirable lifestyle. There is little hard evidence to assess the impact of advertising on smoking habits, but the Canadian tobacco industry considered advertising and promotion important enough to spend about \$60 million dollars on it in 1977 (equivalent to about 100 million 1982 dollars). Furthermore, one suspects that many persons who have thought of quitting or have tried to quit have been seduced by the advertisement for the new "light" cigarettes. One of the implied messages of such advertising is that "light" cigarettes are safe but there is no evidence to support this.

The 1982 report of the U.S. Surgeon General included a review of recent developments in smoking prevention programs. The successful programs all utilized social-psychological theory and were school-based with emphasis on grade 7 students. They emphasized the social and immediate consequences of smoking rather than long-term health consequences. These programs have placed special emphasis on teaching skills in recognizing and resisting social pressures to smoke.

The protection of the fetus, infants and children from the harmful effects of second-hand smoke must be assigned high priority even though there are obvious problems. Surprisingly, there are no data on the current prevalence of smoking

inhalation and after single doses. The sidestream smoke of filtered cigarettes contains a particularly high concentration of NDMA. A non-smoker exposed to air heavily contaminated by tobacco smoke inhales as much NDMA in one hour as a smoker does by smoking 15 non-filter or up to 35 filter-tipped cigarettes.

Sidestream tobacco smoke contains relatively high concentrations of two chemicals known to be human carcinogens: 2-naphthylamine and 4-aminobiphenyl. Section A1B of the 1981 edition of Threshold Limit Values (TLVs) published by the American Conference of Governmental Industrial Hygienists indicates that for these and other human carcinogens, "no exposure or contact by any route - respiratory, skin or oral, as detected by the most sensitive methods - shall be permitted".

Recent Studies Suggest Danger

Until quite recently little was known about the long-term health effects which might occur among non-smokers chronically exposed to tobacco smoke. One could have predicted health effects based on the simple fact that non-smokers are exposed to the same toxic substances present in tobacco smoke as smokers. However, very little dosimetry has been done to quantify such exposures among non-smokers and it was not possible to extrapolate with any great confidence from smokers to non-smokers. Several recent studies have changed the situation dramatically. Aronow in 1978 demonstrated that persons with angina pectoris have substantially increased susceptibility to exercise-induced attacks when exposed to relatively modest concentrations of tobacco smoke in both ventilated and unventilated rooms. Impaired respiratory function was demonstrated in the children of parents who smoked by Tager *et al.* in 1979. Compared to children with two non-smoking parents, forced expiratory flow (25-75% of forced vital capacity) was reduced by 0.16 and 0.36 standard deviations, respectively, for children with one and two smoking parents. Similarly, increased risks of respiratory disease including pneumonia have been observed among infants and children whose parents were smokers. Also the risk of sudden infant death syndrome is increased for infants whose mothers or fathers smoke. Most persons would probably agree that an infant or child has the right to adequate nutrition, clean air and clean water. Children may be more susceptible to air pollutants than adults due to their greater lung ventilation rate per unit body weight. Leeder and colleagues stated that "Parental smoking, however, stands out from all other factors as the one most amenable to change in seeking to prevent bronchitis and pneumonia in infants". There is also some evidence that women who smoke during pregnancy have a substantially increased risk of giving birth to congenitally malformed infants.

Non-smokers are often exposed to tobacco smoke in the work area. A study of 2100 adult residents of San Diego revealed evidence of small airway obstruction in non-smokers employed for 20 or more years in enclosed working areas where smoking was permitted. The impairment was equivalent to that

among pregnant women or the proportion of pregnant smokers who receive advice on the hazards of smoking. However, data gathered during the Nutrition Canada Survey in 1970-72 indicate that 39% of white women and over 60% of Indian and Inuit women smoked while pregnant. The need to educate smoking parents about the harmful effects of their smoking on their children could and should be met through multiple methods including television, film, physicians, and prenatal clinics.

Chronic Diseases, Vol. 3, No. 1, June, 1982.

ANNUAL MEETING

Saturday, May 12, 1984

Rockton Community Hall,
Rockton, Ontario.

Business Meeting: 1:15 p.m.

Guest Speaker: 2:15 p.m.

Speaker: Bruce Small, P.Eng.

President of Small & Associates - a planning and environmental research company known for its work in the field of building-related illness.

Executive Director of the Foundation for Independent Research in Technology and Health, a charitable organization developing information systems concerning environmental health.

Bruce and Barbara are co-directors of Sunnyhill Research Centre, an experimental low-pollution health facility in Goodwood, Ontario.

Topic: "Signs of Spring: A New Climate for Environmental Change in Canada."

Smoking on Airlines: Smokers may soon have to sit on a wing.

Judging by the number of complaints sent to airlines about smoking in aircraft and the recent discussion about smoking-related fires on aircraft, non-smokers may be inching toward relief from tobacco smoke in flight.

Item - Fire Threat to Non-Smokers

Although recent reports suggest that a cigarette did not cause the fire on the Air Canada DC-9 with the resultant tragic loss of 23 lives, the issue has been joined, the question has been raised.

It does not matter a great deal that a cigarette may not have caused the fire on this flight. What matters is that the NSRA has recently learned that cigarette-caused lavatory fires are not uncommon on airplanes. It's just that travellers have been mostly lucky so far. The next one may not be within 13 minutes of an airport. What in blazes (pardon the pun) will happen if an aircraft catches fire halfway across the Atlantic? There won't be any fire trucks on the runway when that plane comes down. Maybe this is the time to write your Member of Parliament and demand a ban of smoking on airlines. Don't waste your time writing the airlines. All they do is send the same responses out to customers, time after endless time. The airlines will change only if they fear the threat of legislation.

Item - Smoking Ban

Scandinavian Airlines is proposing to ban smoking on its short-haul flights in Europe. Muse Air in Texas has already taken this important step. When will other North American airlines accept greater responsibility for the safety and comfort of their non-smoking, non-polluting passengers?

Item - Air Crew in Revolt

The NSRA had a recent visit from a representative of the Canadian Airline Flight Attendants' Association. He informed the NSRA that many CALFA members resent working in the smoking sections on their flights and are determined to do something about it. In fact, we have been told by a number of sources that the smoking issue is high on the list of safety matters which CALFA plans to address. It is safe to assume that, after the recent Air Canada DC-9 fire, the smoking issue has been bumped several notches higher on that list.

Excerpts from:

Indorair, (Summer, 1983), p. 7.

Editor's Note: If you are interested in your rights as a non-smoker, contact:

NON-SMOKER'S RIGHTS ASSOCIATION
L'ASSOCIATION POUR LES DROITS DES NON-FUMEURS
Suite 201, 455 Spadina Avenue (at College),
Toronto, Ontario,
M5S 2G8

(416)595-1538

DESIGNERS WORKSHOP ADDRESSES INDOOR POLLUTION

Norman T. Gilroy

*Norman T. Gilroy is an architect and environmental planner.

Those of us whose decisions shape the designed environment bear an enormous responsibility. Our actions literally shape the life-opportunities of thousands and even millions of people who come into contact with the places we design.

Our built places endure for tens or even hundreds of years, and in every minute of that time they affect powerfully the health, well-being, creativity and productivity of the people who use them and depend upon them.

Our challenge as designers is to find ways to place a concern for the health, nourishment and well-being of every human being at the very center of our work, and to balance that concern with the other forces that seem to preoccupy designers today - style, technology, economics, function.

The Institute for the Human Environment is an organization dedicated to that challenge.

The Institute's work is divided into three holistically interrelated areas. First, land-use planning and policy in the large scale environment is seen as the shaping context for the human quality of life. Second, the built place is perceived as the most immediate human environment which profoundly affects the health and well-being of each of us.

Third, the future is seen as the context in which all of our actions as designers will function and be judged. As we shape our environment, it shapes us - positively or negatively.

Typical of the Institute's work was a recent workshop in the beautiful garden-like setting of the Westerbeke Ranch in Sonoma County. It was sponsored by the Center for Responsive Design with the aid of a grant from the Herman Miller Company of Zeeland, Michigan. The center is the division of the Institute that focuses on the human response to indoor environments. The workshop dealt with "indoor pollution" - or to put it more positively, strategies to build healthier environments. For three days researchers, physicians and clinical ecologists from all over the country gathered with key design shapers - representatives of management, labor and government, as well as architects, interior designers, space planners and engineers from some of the most influential organizations in Northern California.

"Buildings can be harmful to your health" was the warning heard from Francis Silver, the nationally respected clinical ecologist and engineer from Virginia. A gas toxicologist, Silver became highly sensitive to toxins in the environment through a massive exposure to chemical fumes pumped from a sun-heated tar roof into his company's laboratory

through a badly placed "fresh air" vent. He now uses his sensitivity to help others identify the smaller scale, but cumulative problems that we all face because of toxic out-gassing by commonly used materials in our indoor environment. As Silver puts it, "If half the staff are asleep at their desks by three o'clock in the afternoon, productivity HAS to be affected".

Most people do not realize that their "perpetual colds", recurring minor headaches, scratchy throats, coughs or frequent eye irritation may be caused by the very air they breathe in their office, home or school. Stressful behavior, small memory lapses, and growing afternoon lethargy cutting into attention spans or disrupting an important meeting are all symptoms that each of us has experienced. More than the results of "last night on the town", they may be signs that all is not well with the work environment. Yet few workers can do anything substantial to change or correct environmentally caused problems. Their options have been eliminated by the designer working without adequate knowledge of the problem.

Hal Levin, lecturer at the University of California at Berkeley and Santa Cruz and a leading investigator in the field, served as workshop moderator. In his keynote presentation, he identified the problem as one of "environment-induced stress" - a total body response to a total body burden. He pointed out that the cumulative and synergistic interactions of stress-causing influences are extremely complex. Mixing non-toxic elements with toxic elements can, in some cases, literally make the non-toxic toxic.

Indoor pollution is a large problem, yet one that has gone virtually unnoticed among designers. A government source calculates that one third of the nation's GNP is related to the built environment. Another reports that urban Americans spend as much as 70 to 90 percent of their lives in indoor environments.

In 1970 at the Earth Day meeting in Hamilton, Ontario, Dr. Theron Randolph of Chicago estimated indoor pollution to be between three and 10 times as great as outdoor pollution in most parts of the United States. Frank Silver estimates that the annual rate of injury from indoor pollution-related sources in the U.S. is approximately five times that caused by automobile pollution. Yet, while millions of dollars are spent annually on automobile pollution research, relatively little is spent to research effects of indoor pollution in the offices, factories and homes of America.

Before the workshop, Dr. Russ Jaffe of Washington, D.C., head of a research team at University of California Medical Center in San Francisco, underlined the growing seriousness of the problem. All of us become sensitized to some degree through continual exposure to an increasingly toxic environment caused by automobile and industrial pollution and by indoor pollution. That puts us on something of a collision course. As our sensitivities grow through exposure our "designed" place becomes more and more toxic. Designers continue to make choices without using the knowledge that

medical researchers now have about the direct and cumulative effects of toxins upon the human organism.

Though the human being is a very adaptive organism, Frank Silver likened it to a rubber band. We can stretch and stretch our ability to adapt, until one day we lose our elasticity and find it impossible to snap back. Then, hypersensitivity takes over and the world is a very different place. It can happen to any of us - and to a degree it is happening to all of us, all of the time.

It is not all a doomsday prediction, however. Designers have many choices available to them that can lead to healthier environments. Here are just a few:

- First, know the sources of potentially harmful effects and the symptoms they cause. Work to find substitutions that minimize or eliminate them. Remember that it is often the small symptoms that count.

- Avoid or seal materials that outgas harmful chemicals. Look carefully at synthetic or petroleum-based products like carpets, carpet padding, drapery fabric, upholstery materials and padding before you use them in large quantities. Substitute healthier alternatives where you can. Seal resin-bonded particle board and plywood if you must use it in cabinets, furniture or partitions.

- Be aware of chemical treatments on familiar materials (e.g. fungicides in paints and moth-proofing on fabrics). Be sure that products specified for one very good purpose (e.g. fire retardant compounds on draperies) are not harmful to the health of the very people they are intended to protect. Watch out for soft vinyl products. The softeners in them outgas in the warm condition of a heated interior and are particularly noticeable in small, poorly ventilated spaces. That new car smell - and that new office smell - may be harmful to your health.

- Second, provide plenty of ventilation. Make sure that used air is mixed with large quantities of fresh outside air (dilution is at least part of the solution). Make sure that the outside air intakes are positioned where the air is, in fact, the freshest - not hidden away in the parking garage or close to used air exhausts of your own or other buildings. Forced air systems burn dust particles, turning them into potentially carcinogenic materials. Filter them out, or use other kinds of heating systems.

- Give people the chance to be in control of their own environments - to modulate temperature and to open windows. This is particularly important in the early months of occupancy when indoor pollution is likely to be at its height. Help the janitor, mechanical engineer or new occupants to set up a routine to air out the building.

- In energy conserving buildings, requirements for a "tight seal" are becoming common. Use of a simple and inexpensive heat exchanger will allow a continual flow of fresh outside

air into the building (bad air out, good air in) while conserving heat and saving energy. Recognize that environmental hazards are present the entire life-cycle of a building and look for them. A remodeling project in a building may have heavy effects during construction not only on its workers but on occupants of surrounding spaces. Health impacts often are most pronounced during the period of initial occupancy when everything is new.

•The period of use and maintenance, which continues throughout the life of the building, also needs attention. Just visit the service entrance of any large hospital or office building and watch the large drums of heavy-duty cleaner, floor wax and disinfectant being wheeled in. Then watch the empty drums from last month's supply being wheeled out; all that volatile material has gone somewhere. Most of it was drawn into the air circulation system of the building, and through that into the lungs of the people living and working there. Yet how many of us specify maintenance techniques for our buildings or have any say in how they are managed after they are completed? Cars come with operating manuals. Why not buildings?

Knowledge in the field of environmental hazards is very like a jigsaw puzzle in which enough pieces are in place to understand the whole picture without all the research being complete. Designers must act responsibly on the information now available.

- * Excerpted from an article in Designers West, April 1981. Original article titled "Intercommunication in an Age of Specialization". Used with permission.
- * Courtesy of H.E.A.L. The Human Ecologist. Nos. 13 & 14, (February & April, 1981), pp. 8-9.

Toronto Branch Report

- 1) Lists have been prepared and sent out establishing a support system network so that members can contact others geographically close to them.
- 2) The Rotation Diet Cookbook compiled by the Toronto Branch has been a considerable success. We currently have a limited number in stock and quite possibly will go to a second printing. Cookbooks are available from:

H.E.F. (Toronto),
65 Dolly Varden Blvd.,
Scarborough, Ontario,
M1H 2K2

Single copy: \$9.00 (includes postage)
10 copies or more: \$6.50 each (includes postage)

NEUROTOXIC FOLLIES

Alan Anderson

Of the 100,000 or so chemicals now in use by American industry, 575 are deemed dangerous in large doses by the federal government, and many of these are known to be associated with catastrophic illness, from cancer to respiratory and lung disease. Perhaps no class of chemicals is more subtle and treacherous in its effects, however, than the neurotoxins, which can damage the human nervous system even in modest doses and cause a variety of behavioral and emotional symptoms - among them, hallucinations, loss of memory, confusion, depression, and psychosis.

Because the changes that neurotoxins bring about are often subtle - and may be confused with psychologically caused symptoms - only in recent years have government and industrial hygienists begun to investigate them. The National Institute for Occupational Safety and Health lists 163 chemicals that, based on direct neurological or behavioral effects, are believed to be dangerous enough to warrant a recommended limit on exposure called a Threshold Limit Value; 43 others rate TLVs because of secondary effects on the nervous system. These chemicals are released in supposedly clean environments, such as some electronics laboratories, as well as traditionally dirty ones like mines. They are present in many products, from household paint and aerosol sprays to shoe polish and seat cushions.

More than 20 million people work with one or more chemicals known to be neurotoxic. Yet NIOSH, which either funds or performs most of the nation's work-place research in neurotoxicology, has thoroughly assessed the behavioral effects of only a few dozen chemicals since its creation in 1970. The field of behavioral toxicology is so new that it didn't even have its own journals until 1979, when both Neurotoxicology and Neurobehavioral Toxicology and Teratology began reporting the news. Last winter, the American Association for the Advancement of Science held a symposium on neurotoxins, called "Environmental Assaults on the Nervous System and Human Behavior".

The problems are not confined to the work place; they also reach the consumer. Chemicals that can be inhaled tend to be mood-changers, and some are addictive. As a result, neurotoxin risk is widespread both at work and on the streets.

"We need to know a lot more about how toxicity is expressed in behavior", says Ronald Wood, a psychologist at the University of Rochester, which supports the country's largest group of behavioral toxicologists. "We need to be able to recommend tests for chemicals before they move into the marketplace. This is why we need more of what NIOSH is doing. As it is, we are still using workers as part of an early-warning system".

Neurotoxins did not begin to attract the attention of the public and the Congress until the summer of 1973, when a 43-year-old worker was admitted to Ohio State University Hospital. The man reported that he had been growing weaker for about a month.

During a follow-up visit two months later, he produced the names of five fellow workers who had the same complaint. All were employees of a coated-fabrics plant in Columbus, which produces patterned fabrics and sheets used for wall coverings and automobile interiors. And all were stationed in the same area - the print department.

A full-scale investigation began. Workers told of weakness in the hands and feet, and difficulty in grasping heavy objects. They said they could barely turn a key, click a cigarette lighter, use a screwdriver. Some had suffered a sharp loss of weight; others walked with a peculiar slapping gait; still others had trouble walking at all.

Exhaustive neurological exams, in which 1,157 workers were clinically screened, showed 86 to have suffered varying degrees of nerve damage. And of the 275 chemicals used in the plant, epidemiologists pronounced methyl n-butyl ketone - a solvent used as an ink thinner and machine cleaner - the culprit.

Before Columbus, few health experts would have thought to look for subtle changes in the nervous system as the sign of dangerous work conditions. True, many toxins were known to damage nerves - typically during episodes of acute poisoning. But here was a supposedly innocuous solvent that inflicted insidious harm upon the nervous systems of unsuspecting workers.

"I would say that the methyl n-butyl ketone outbreak was the key episode in bringing attention to the field of behavioral toxicology", says Kent Anger, chief of neuro-behavioral research at the NIOSH laboratory in Cincinnati. "That signaled a shift in thinking about behavioral problems. Before Columbus many of us thought, 'Well, people who work with some chemicals might have trouble concentrating, or maybe even some temporary or unimportant changes'. After Columbus, we could see that even relatively safe chemicals, in concentrations that pose no danger to other systems of the body, can bring serious and sometimes irreversible damage to the nervous system".

For each methyl n-butyl ketone that comes to light, dozens or hundreds of chemical cousins whose potential danger is unknown may be lurking in work places throughout the country. But it may be years before the behavioral effects of even a fraction of them are tested. One reason: Anger's staff in Cincinnati consists of only six scientists and three support workers. Present funding for health and safety research of all kinds comes to about 50 cents per worker per year; the budget for behavioral toxicology research is a small fraction of that.

Typically, the first warnings of neurotoxicity are subtle - tingling and numbness in the hands or feet. Further symptoms usually develop slowly over many weeks or even years, and may be neuromuscular (tremors, lack of coordination, paralysis, impotence), sensory (numbness, pain, or damage to vision, hearing, touch, or smell), cognitive (lowered alertness, loss of memory, decreased intellectual functioning), psychological (lethargy, irritability, depression, hallucination, psychosis), or a combination of the above. Some cases require prolonged hospitalization or therapy.

A significant number involve irreversible damage. Because the central nervous system cannot replace lost cells, damage to the central memory and intellectual control functions is essentially permanent.

Kent Anger points out that many neurotoxic effects are mistakenly attributed to other causes, such as fatigue, advancing age, or off-work habits. Workers may feel ashamed at their lassitude or inattention, blaming themselves for their weakness and ignoring the increasing danger signals. "Due to the fact that the nervous system functions to detect and avoid dangers in the environment", says Anger, "impairment of sensory or neuromotor capabilities may be responsible for a substantial portion of avoidable accidents in industry today".

The task of matching behavioral abnormalities with their causes is especially difficult when workers are reluctant to talk about them. For example, NIOSH-supported investigators were called in recently to check some workers who were synthesizing polyurethane foam for seat cushions. The men described a tingling sensation in the hands and feet, as well as problems with urination.

"Only after the investigation was under way did we learn that these men were also unable to have an erection", says Edward Baker of Harvard's School of Public Health. "That's not the kind of thing they would talk about. We might never have known if it hadn't been for their bladder problems.

"It was the same with a soil fumigant known as DBCP - dibromochloropropane. Workers had been suffering from sterility for quite some time, but it wasn't until they happened to get together and start comparing notes that they found out how widespread the problem was. We don't know how many behavioral problems are hidden this way".

The threat of work-place chemicals even reaches across generations. B.K. Nelson at NIOSH has been studying how various chemicals given to pregnant rats affect their offspring - a new field known as behavioral teratology. He has recently been working with 2 ethoxyethanol, a chemical cousin of ethyl alcohol. Some 360,000 workers nationwide use this solvent in nitrocellulose, lacquers, dyes, varnish removers, and in numerous industrial processes. Nelson and his colleagues found that while pregnant rats were not affected by low doses of 2 ethoxyethanol (half of the federal work-place limit), their offspring were. His tests revealed significant changes in both brain chemistry and behavior after birth.

"This was surprising", says Nelson. "Ethoxyethanol was thought to be one of our safer compounds. This indicates that there are industrial chemicals that could be affecting the reproductive health of humans - especially when you take into account the current influx of women into vocations traditionally restricted to men".

Nelson's concern was deepened by the results of a second study with pregnant rats. Along with the same dose of ethoxyethanol, he added alcohol - the drinkable kind - to the rats' overnight drinking water. He found that the neuromotor and

neurochemical deviations in the offspring were about twice as severe as those caused by ethoxyethanol alone. He expressed concern about the implication for humans: "I would say that workers exposed to this chemical, and perhaps similar chemicals, who consume a heavy amount of alcohol might be affected in similar ways".

Some of the chemicals that have drawn the attention of behavioral toxicologists are known to be harmful and even lethal in heavy doses. What is new is that researchers are finding damage at even the microdose levels encountered in relatively clean work places:

Carbon disulfide. One of the best-known and oldest threats to the nervous system is carbon disulfide, CS_2 - an essential ingredient in the manufacture of viscose rayon and cellophane. Despite its well-documented toxicity to the nervous system, as well as the cardiovascular and reproductive systems, it is still part of business-as-usual for some 24,000 workers in this country.

Soon after its discovery in the late 18th century, it was, like many toxins, seized upon as a general anesthetic. In the late 1840's the Scottish surgeon J.Y. Simpson reported that he was discontinuing its use because of hallucinations, headaches, and nausea in patients. But in the next decade CS_2 achieved its precious ability to impart elasticity to rubber at all temperatures, leading to the development of waterproof clothing, rubber toys, balloons, and contraceptives. In making India rubber, caoutchouc sap was softened with CS_2 , then spread out into rubber sheets. The worker was exposed directly to CS_2 vapor.

Within just a few years, the effects of this new agent were known. Auguste Delpech, a French physician, wrote in 1856: "He who works in the 'sulphur' is no longer a man. He may still make a living from day to day in unskilled labor. He will never be able to establish an independent position for himself. The depressing influence of the carbon disulfide upon his willpower, the painful consequences of his indifference, the loss of his memory, prevent him from entering another occupation".

Delpech described a rubber worker's son who, after three days of play in his father's workshop, was "stricken with a type of raging delirium" during which he "hurled himself at his father to bite him". The rubber industry had expanded enormously by the turn of the century, but the dangers were ignored. In 1902 a British publication, Dangerous Trades, described a factory in which the windows of the vulcanizing room were barred to prevent poisoned workers from leaping out during attacks of mania. X

CS_2 is still causing problems. Helena Hanninen of Finland reports that modern workers, even in clean, ventilated rayon factories, show losses of speed, vigilance, working capacity, sociability, and intelligence. Another study showed similar losses in psychomotor performance and changes in three of five variables indicative of depression on Rorschach tests.

Lead. This metal was identified as a neurotoxin even before CS₂. Smelter workers in particular have been afflicted since before Christ by disorientation, blindness, and peripheral neuropathy (nerve damage to hands and feet). Numerous recent studies have revealed behavioral changes in miners, toll collectors, solderers, smelters, battery and electronics workers, and even workers whose lead blood levels are below the national safety standard.

In a review for The British Journal of Industrial Medicine, Edward Baker of Harvard and his co-authors described an "unexpectedly high prevalence" of lead poisoning at three different American work sites: "Although the three plants in which these cases occurred may have come to our attention because exposures in them were atypically poorly controlled, they are by no means unique in the United States, and there is no way in which the existence of the working conditions found in them can be justified in a modern and humane society."

Volatile fuels. A Swedish study of aircraft-factory workers exposed to jet fuel reported that they had poorer scores on behavioral tests that made high demands on attention and speed than did a set of controls. The workers also displayed more psychiatric symptoms, such as depression and neurotic disturbances.

Paint solvents. A Scandinavian study of 52 house painters revealed lower scores than controls on tests of intellectual capacity, psychomotor coordination, memory, and reaction time.

Anesthetic gases. Anesthetics are delivered to patients through pressure-relief valves, which often permit gases to escape into an operating room. Nitrous oxide and halothane, when inhaled in concentrations as low as 50 parts per million and one part per million respectively, reduce visual perception, recent memory, and a combination of perceptive, cognitive, and motor responses - skills sorely needed in an operating room.

Carbon monoxide. Despite the early role of CO in stimulating concern about air pollution, only one work-site behavioral study has been done. Barry Johnson and his colleagues at NIOSH studied the performance of toll collectors on a highway in Kentucky and found them less able than a group of controls to maintain a foot-tapping task while performing a visual signal-detection task. In a summary of other test results, Johnson and Anger write: "The salient feature is that the ... task or job must be difficult. What this suggests is that low-level CO exposure may not affect workers' performance on routine, nondemanding jobs; however, it may affect performance of jobs or situations requiring rapid response to the operation of complex equipment or machinery".

To date, the NIOSH group has conducted or funded work-place studies on CS₂, CO, formaldehyde, inorganic lead, inorganic mercury, methyl chloride, tetrachlorethylene, and leptophos. They have also helped to write NIOSH "criteria

documents" on 15 chemicals, including recommended exposure levels for workers.

The most recent field study was completed in March in California by a 10-person task force led by Anger. The study was typical in that the chemical - methyl bromide - is a known neurotoxin at fairly high concentrations; Anger's group wanted to determine the effects, if any, of low-level, chronic exposure. Methyl bromide is the weapon of choice for termite exterminators, being both cheap and effective. The fumigators, in a process known as bagging, place a huge plastic covering over a house, then release the chemical inside. When the bag is removed after one day, the worker is exposed to varying amounts of methyl bromide - with still unknown effects.

"We won't know the results for several months", said Anger shortly after returning to Cincinnati. "Our group tested 155 workers from 36 different companies with a battery of sensory, motor, and cognitive tests. If we find a significant incidence of the dangerous symptoms of acute exposure, we'll add the results to the criteria document that NIOSH is writing and recommend that these people be exposed to less methyl bromide than they are now getting".

Anger was pleasantly surprised by the attitude of the fumigation companies. "I talked with 20 of them, and only one declined to be interviewed, refused to have anything to do with NIOSH. But most said that if there's a problem, we want to know about it, and even paid the workers for their time during the testing. And these were small companies, rugged individualists who don't usually like government".

In addition to studying the effects of chemicals in the work place, NIOSH uses an inhalation chamber to measure the effects on humans under controlled conditions. The chamber, a converted meat locker with holes drilled in the ceiling and floor, is designed to expose two subjects to a work-place atmosphere for a full workday, testing their behavioral functions as the day wears on. Most of the subjects are student volunteers from the University of Cincinnati who get \$8 an hour for a 10-hour day, plus one free soft drink. (They are discouraged from having more than one, since every trip to a restroom causes a rapid "blow-off" of the test chemical from their bloodstream.)

To date, the NIOSH group has run chamber tests with carbon monoxide and four solvents, along with various legal drugs, such as Valium and alcohol. "We're very strict in choosing our chemicals here", says Vernon Putz-Anderson, who has carried out most of the chamber studies. "We first eliminate any that are known to be carcinogenic, mutagenic, and teratogenic in animals, and that doesn't leave very many. We have to be able to demonstrate zero risk to humans at low doses, and that's not easy. Everyone is very sensitive in this area because of past abuses. We give our subjects blood and breath tests after we're finished, as well as a complete exam by a physician before and after. They have to be completely 'street safe' - no trace of chemical left in the body. We even worry about the chance that a person may have an auto accident on the way home and decide to sue us."

A typical chemical studied by Putz-Anderson in the NIOSH chamber is methyl chloride, a common solvent used in the rubber and plastics industries by nearly 50,000 workers. "We started working on it because it is one of the most widely used chemicals, one that is considered safe. And we found effects. Every solvent we have tested has shown central nervous system effects."

In the chamber, subjects can be videotaped as they work; they can communicate with the outside world by intercom. "What we get from all these solvents are fairly subtle effects", says Putz-Anderson. "Sometimes the subjects start to fall asleep and I have to call in and say, 'Hey, wake up, boys, we've got work to do'. With more than one chemical, the effects add up and it is really hard to stay alert. With methyl chloride there is a drop in performance of about 5 percent to 6 percent. Valium takes away another 10 percent. Same kind of additive effect for alcohol. So if a worker is operating an expensive or dangerous machine, the chemical plus any outside drugs can make a real difference in performance."

Considering the dangers, it is surprising that many people expose themselves to neurotoxins deliberately and persistently. Products of choice for thrill-seekers include both volatiles (paint thinner, shoe polish, glue, contact cement, lighter fluid, gasoline, dry-cleaning fluid, liquid wax, nail-polish remover, degreasers, refrigerants, brake fluid) and aerosols (acrylic sprays, cold-weather car starters, air sanitizers, glass cleaners, furniture polishes, insecticides, disinfectants, spray medications, deodorants, hair sprays, vegetable-oil sprays, paints). Anesthesiologists, hospital technicians, and dentists inhale halothane, ether, cyclopropane, nitrous oxide, ethyl chloride, and chloroform. Researchers in the field have long since discarded the term "glue sniffing" as quaint: Now it is "inhalant abuse".

No one knows how many workers abuse the inhalants they work with. It is a topic that few users discuss in public - perhaps because of secrecy or shame, often because they may actually be unaware that they are addicted.

A combination of these reasons kept a man I'll call Mr. S. from seeking help earlier. Mr. S. worked as a master optician for a leading electronics research firm from age 24 to age 36. A meticulous technician, he used toluene and trichloroethylene to clean his lenses and his tooling and electronic equipment. He applied these solvents within inches of his face, and little by little he became addicted to them. Symptoms of behavioral change began after about eight years, including peripheral neuropathy, insomnia, heart palpitations, and a failing memory. After a series of physicians were unable to help, an alert mental-health counselor finally diagnosed the toxicity. Mr. S. now attends Alcoholics Anonymous meetings - not for the addiction, which he has escaped, but to gain some structure for what has become a life of confusion and helplessness.

"It all happened quite gradually", he told me. "In the beginning I thought, 'Whoof! This is strong stuff!' Then, after a while, I wasn't finding it strong. I found myself cleaning more and more - cleaning a whole lot of things."

"I began to feel an awful lot of energy. I would feel my insides just jiggling up and down. In the afternoon, when everyone was getting ready to go home, I would think, 'God Almighty, how can they leave? Things are just beginning to roll!' My thinking was tremendous - I could solve any problem and even take on other people's jobs. I didn't sleep much. My mind was racing like a fiend.

"But at the end something went wrong somewhere - I still don't know what. I would get weak, couldn't sleep, got all nervy and shaky. I wanted to get away from people. They seemed to be kind of jostling me. I began to get the feeling I was crazy, felt as though I was going down. And I would sweat. The sweat would run down my back, down both arms, down my legs. I'd be wiping my face all the time. People just thought I was overworking; it was a competitive kind of place. I used two pairs of coveralls - one for the morning and one for the afternoon. After one was wringing wet, I'd put on the other.

"Then I had trouble walking around desks; I would kind of float to the side and knock into things. I couldn't pour coffee. It just wouldn't sit still.

"The thing that got me most of all was the lack of knowing what was wrong. It was like walking into a snowstorm. You have poor visibility but you just keep going. There was a feeling of fear. I was starting to lose something and I didn't know what it was. My memory had always been excellent and it began to go. I'd take a book out of the library and I wouldn't remember I'd done it. People would have to remind me and I'd avoid them.

"I left work about five years ago and had a very bad time. I was running to doctors for help and they could find nothing wrong. I'm a healthy-looking fellow; overwork, they said. Take it easy.

"My memory is still the worst problem. I do all sorts of silly things. Someone will ask me to open the door and I'll lock it instead. When it's time to do the dishes I'll go into the bathroom and fill the tub; then here comes the water running down the stairs. Some mornings when I wake up I think my head is just a great big glueball and I just feel very, very dumb. I no longer rely on myself at all."

Beyond the work place, inhalant abuse is a health problem primarily among the very young and those who cannot afford more costly drugs. It takes the heaviest toll among Mexican-Americans, Indians, blacks, and other minorities, but it is by no means confined to non-whites. A 1975 survey in New York State revealed that 5.2 percent of all students in grades seven through 12 were using solvents to get high, and the percentage was higher upstate than in New York City.

Solvents are popular because they are cheap, legal, and quick-acting: Inhalation causes entry to the bloodstream almost as fast as intravenous injection. They are also highly dangerous. Manufacturers of, say, furniture polish do not design their ingredients for ingestion; a sudden switch from toluene to n-hexane, for example, can result in tingling, paralysis, and even death

for unsuspecting teenagers.

"It is difficult to understand why anyone would use industrial solvents and household aerosols for purposes of intoxication", says Sidney Cohen, clinical professor of psychiatry at the UCLA School of Medicine. "Abused solvents are known to be impure. Often they are combinations of many esoteric chemicals, and, as in the case of gasoline or aerosols, they contain known toxic metals or other injurious substances."

One surprising aspect of inhalant abuse is that animals, who can usually recognize poisons, have no more sense regarding these chemicals than humans do - and no less. They will voluntarily sniff the chemicals abused by humans, and avoid the same ones we avoid, like ammonia. (The only exceptions are hallucinogens, which animals decline to use.) Ronald Wood at Rochester has generated animal models of inhalant abuse, using rats and squirrel monkeys. A monkey, for example, wears a one-liter helmet into which it can force a little puff of nitrous oxide or toluene by pressing a button.

"These animals can help us to recognize any chemical that is addictive before it hits the market", says Wood. "Abuse is especially harmful because it exaggerates any toxicity a substance might have. Typical are the alkyl nitrites, which are being sold as liquid incense under labels like Locker Room and Rush. What's happened is that people are not using the stuff as a room deodorizer, but are inhaling it. High-school kids have been using it for years. It dilates the blood vessels, and when the heart rate goes up to compensate, there is a big rush. Beyond that, it is an orgasm enhancer and a sphincter dilator. Surveys in both Great Britain and the United States have shown that 86 percent of homosexual men have used alkyl nitrites within the last five years, and 54 percent within the last month.

"The incense sells for \$5 to \$10 a bottle and makes a \$20-million to \$100-million business", he says. "And the business is coming out of the hides of homosexuals and high-school kids. I have petitioned the EPA to ban the inclusion of alkyl nitrites in consumer products. The FDA can't touch it; it's not sold as a drug." Wood also cites epidemiological studies that suggest a possible connection between abuse of alkyl nitrites and a virtual epidemic of Kaposi Sarcoma, a rare form of cancer in homosexual men aged 25 to 40.

The regulation of potential neurotoxins is uneven, especially under the present Administration. Primary among regulatory laws that apply to neurotoxins are the Toxic Substances Control Act (TOSCA) and the Clean Air Act, both administered by the EPA, and the Occupational Safety and Health Act, administered by OSHA. Toxicologists do not sense in Washington the same commitment to worker safety that gave rise to these laws.

"We're very concerned that the enforcement of OSHA standards is being softened", says Baker of Harvard. "And the new EPA is being asked to enforce TOSCA, a very difficult law. We've been studying foundry workers exposed to lead for several years, and the implications of the study are fairly clear. We have found

behavioral and attitudinal changes in people with less lead in their blood than the present federal standard calls for. About a million workers are exposed to some amount of lead today. A new, more stringent exposure standard is due to come into effect. We are worried that there is an effort in Washington to slow the phasing-in process."

Indeed, the regulators themselves confess to a lack of urgency under the Reagan Administration. For example, the EPA announced plans a full year ago to require further testing of methyl chloride. The EPA's article in The Federal Register called for a thorough reassessment of the exposure limit based on a long list of concerns, from the dangers of addiction and neurotoxic effects to evidence of chemical-induced tumors and birth defects.

Even so, nothing has yet been done. "Thus far, the EPA has not proposed neurological or behavioral testing for methyl chloride", admits Bill Sette of the EPA's Office of Toxic Substances. "We now have several general guidelines for assessing nerve damage in animals, but this covers only a small part of the potential effects of known neurotoxicants such as methyl chloride."

Millions of Americans spend their working lifetimes without knowing what they breathe on the job. Yet the task of setting standards that are truly safe has just begun. Some of the largest corporations, such as Dow Chemical, Du Pont, and General Motors, allocate significant resources to health protection. But to medium-size and small companies, worker safety is still a new concept.

In other countries, especially in Europe, the debate over worker health was settled long ago - in favor of the worker. The Finns, for example, now have about 500 people doing research in occupational health, for a population of about two million workers. The United States, in contrast, has about 700 researchers for 60 million workers.

Baker says that this surprising difference reflects deep-rooted cultural values. "The Scandinavian people are simply more interested in improving the quality of the worker's environment than we are. Here, you're considered lucky to have a job at all."

Note: Alan Anderson is a journalist who specializes in medicine, environment, and other scientific subjects.

WORKERS AT RISK FROM NEUROTOXINS

Below, the principal neurotoxins used in industry, the symptoms associated with them, and the number of workers chronically exposed according to government estimates. Dashes mean that figures are unavailable or that workers are exposed only by accident. Chemicals in capital letters pose the greatest risk. (Data from the National Institute for Occupational Safety and Health.)

SUBSTANCE	INDUSTRY	YEAR OF FIRST REPORT OF NEURO-TOXICITY	EFFECT	NUMBER OF WORKERS POTENTIALLY AT RISK
CARBON MONOXIDE (CO)	Industries using combustion processes	Before Christ	Reduced attention span	-
LEAD, INORGANIC	Smelters	Before Christ	Disorientation; blindness; nerve damage to hands and feet	649,000
Mercury, inorganic	Hat manufacturing	1557	Tremors in hands, face and legs	33,600
CARBON DISULFIDE	Rubber vulcanization	1856	Nerve damage in hands and feet; psychosis	24,200
Thallium	Glass making	1862	Nerve damage in lower limbs; damage to optic nerves and eye	853,000
Mercury, organic	Chemical research	1865	Visual-field constriction; nerve damage in hands and feet	-
Triethyltin (organotins)	Pharmaceuticals	1880	General weakness; vertigo	-
METHYL BROMIDE	Fumigation	1899	Nerve damage in hands and feet	105,000
CARBON TETRA-CHLORIDE	Dry cleaning	1909	Visual-field constriction	2 million
METHYL CHLORIDE	Rubber and plastics	1914	Nerve damage in hands and feet; blurred vision; short-term memory loss	40,500
TRICHLORO-ETHYLENE	Degreasing, dry cleaning	1915	Loss of facial sensation; impaired memory and concentration; tremors	3.6 million

Cadmium	Metalworking	1930	Loss or impairment of sense of smell	1.4 million
Triorthocresyl-phosphate (TOCP)	Pesticides	1930s	Nerve damage in hands and feet	-
Manganese	Mining	1944	Psychosis; impaired speech; tremors; loss of coordination; muscular weakness	41,000
Acetone	Cellulose production	1955	Vertigo; weakness	-
Dieldrin (and aldrin)	Pesticide application	1957	Epileptic convulsions; loss of coordination; blurred vision; double vision; nystagmus (involuntary blinking)	10,400
PERCHLORO-ETHYLENE	Degreasing, dry cleaning	1957	Vertigo; lack of coordination; tremors; memory loss	-
N-HEXANE	Gluing, shoemaking	1960	Nerve damage in lower limbs	764,000
TOLUENE	Paints, explosives	1961	Tremors; vertigo; lack of coordination; bizarre behavior; emotional instability	4.8 million
Aluminum	Mining, refining	1962	Mental deterioration; aphasia; convulsions	-
Acetylene tetrachloride	Solvent-multiple uses	1963	Tremors; vertigo	-
STYRENE	Plastics, manufacturing	1963	Short-term memory loss; nerve damage in hands and feet	329,000
Methyl isobutyl ketone	Centrifuge operation	1964	Muscular weakness	-
Acrylamide	Chemical manufacturing	1966	Nerve damage in hands and feet	7,000
Paraquat	Pesticide	1966	Tremors; mental disturbance	1,130
METHYLENE CHLORIDE	Solvent-multiple uses	1967	Delusions; hallucinations	2.2 million
Pentachlorophenol	Pesticide	1971	Blind spot; corneal numbness and damage; autonomic nervous system impairment	-

Tetrachloro-biphenyl	Food (cooking-oil accident)	1971	Nerve damage in hands and feet	-
METHYL N-BUTYL KETONE (MBK)	Dyeing	1973	Nerve damage in lower limbs	-
POLYBROMINATED BIPHENYLS (PBBs)	Fire extinguishers	1973	Poor concentration; irritability; numbness in extremities; blurred vision; eye-movement impairment	-
CHLORDEKONE (KEPONE)	Pesticide	1975	Tremors; nervousness	-
DIMETHYLAMINO-PROPIONITRILE (DMAPN)	Polyurethane foam	1977	Impotence; lack of urination control; tingling in hands and feet	-

Alan Anderson, "Neurotoxic Follies", Psychology Today, (July, 1982), pp. 30-42.

For further information, read:

Johnson, Barry L. and W. Kent Anger. "Behavioral Toxicology", in Environmental and Occupational Medicine, William N. Rom, ed., Little, Brown, 1982, in press.

Sharp, Charles Wm. and Mary Lee Brehm, eds. Review of Inhalants: Euphoria to Dysfunction, National Institute on Drug Abuse, USDHEW Pub. No. (ADM) 80-553, 1977.

Spencer, Peter S. and Herbert H. Schaumburg, eds. Experimental and Clinical Neurotoxicology, Williams and Wilkins, 1980.

Weiss, Bernard and Victor Laties, eds. Behavioral Toxicology, Plenum Press, 1975.

Wood, Ronald W. "Reinforcing Properties of Inhaled Substances", Neurobehavioral Toxicology, 1(1979): 67-72.

Xintaras, C., Barry L. Johnson, and I. de Groot, eds. Behavioral Toxicology, National Institute for Occupational Safety and Health, USDHEW Pub. No. (NIOSH) 74-129, 1974.

Indoor Air Pollution: The Home

By Phyllis Saifer, M.D., M.P.H. and Mark Saifer, Ph.D.

Phyllis Saifer practices allergy in Berkeley, Calif., and serves on HEAL's advisory board. Mark Saifer is a biophysicist engaged in private research.

The chemically sensitive patient is made ill by fumes from common materials in the home. Items that we usually think of as totally inert and harmless such as plastics, synthetic fabrics, woods and even metals "outgas" for many years. It is essential to understand the concept of "outgassing". The materials listed above all have volatile components that evaporate, even metals and hardwoods, and put materials into the air. These fumes are inhaled by the susceptible person and can cause reactions. Outgassing has been studied by NASA and the following list has been prepared in order of increasing degree of "outgassing":

- Stone
- Ceramic
- Steel
- Iron
- Hardwood
- Copper
- Aluminum
- Fluorocarbons
- Polyurethanes
- Epoxies
- Silicones
- Polyvinyls
- Polyethylenes
- Polyesters

The sources of most of these materials in the home are readily apparent.

Fluorocarbons: teflon and freon which leaks from refrigerators and freezers.

Polyurethane: pillows, mattresses, insulation on cold appliances, furniture stuffing, building insulation.

Epoxies: adhesives on plastics and on electrical and electronic equipment. These heat up and cause epoxy to outgas. TV's, microwave ovens, home computers, etc.

Silicones: sealant used to keep water out of electrical equipment, dishwashers, washing machines, refrigerators - all major appliances.

Polyvinyls: soft ones: shower curtains, leatherette upholstery, artificial flowers, electrical insulation.

hard vinyl: polyvinyl chloride - gas pipes, water pipes, electrical conduits, molded components of household equipment which are not directly subjected to high temperatures.

Polystyrene: food containers, home and commercial. Styrofoam - insulation, hot beverage containers, ice chests.

Polyethylene: food containers, commercial and home types, milk containers.

Polyester: fabrics for clothing, upholstery, drapery, etc. Stuffing for pillows, quilts, furniture and winter garments.

Woods: Soft woods such as fir, cedar, redwood and pine have resins or terpenes (Christmas tree odor) which will outgas for many years. These are frequently used in home construction. Fumes from hardwoods bother some people and are found in furniture and flooring.

All of the above materials contribute something to indoor air pollution and the decision to eliminate any of these must be made on an individual basis.

Another set of sources of indoor air pollution includes:

- natural gas
- propane gas
- chlorine
- formaldehyde
- pesticides
- solvents and paints
- scented cleaning agents and deodorizers
- waxes
- inks
- car exhaust

Natural gas: combusted and uncombusted, has been found by Dr. Randolph and confirmed by other researchers to be the major source of indoor air contamination. The major offender is the gas stove which must be removed; turning it off is not adequate. For the very sensitive person all gas in the house must be turned off and the pipes removed.

Chlorine: is present in water as a disinfectant and in bleach. For some people drinking filtered water or spring water is a satisfactory elimination of chlorine. For others, the chlorine in bathwater, the toilet bowl and in the dishwasher is too much and the entire water system must be filtered.

Formaldehyde: outgasses from plywood, paper products, fabric finishes, air deodorizers and many, many other sources. (SUFFER - R.R. 1E, Box 148C, Waconia, MN 55387 - can provide a much more complete listing.) Formaldehyde also numbs the sense of smell, so it is used in some room deodorizers.

Pesticides: are present indoors, outdoors, on pets and in foods. Residues may be present in cottons and woollens as fumigants and mothproofing. Exterminators may contaminate a home and leave residues impossible to remove satisfactorily.

Solvents: such as paint, come in cans which do not reseal tightly enough to be stored indoors by the chemically sensitive.

Inks: are present in newsprint, books and felt-tip markers.